Microphysical processes during OLYMPEX: Insight from a research S-band polarimetric radar

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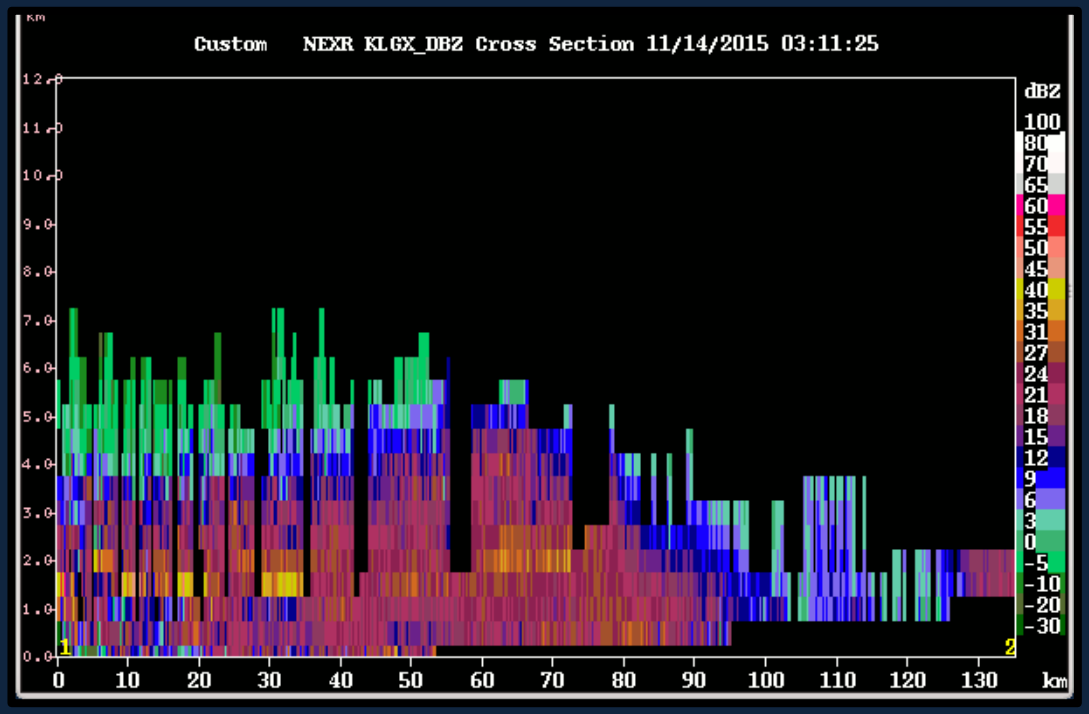
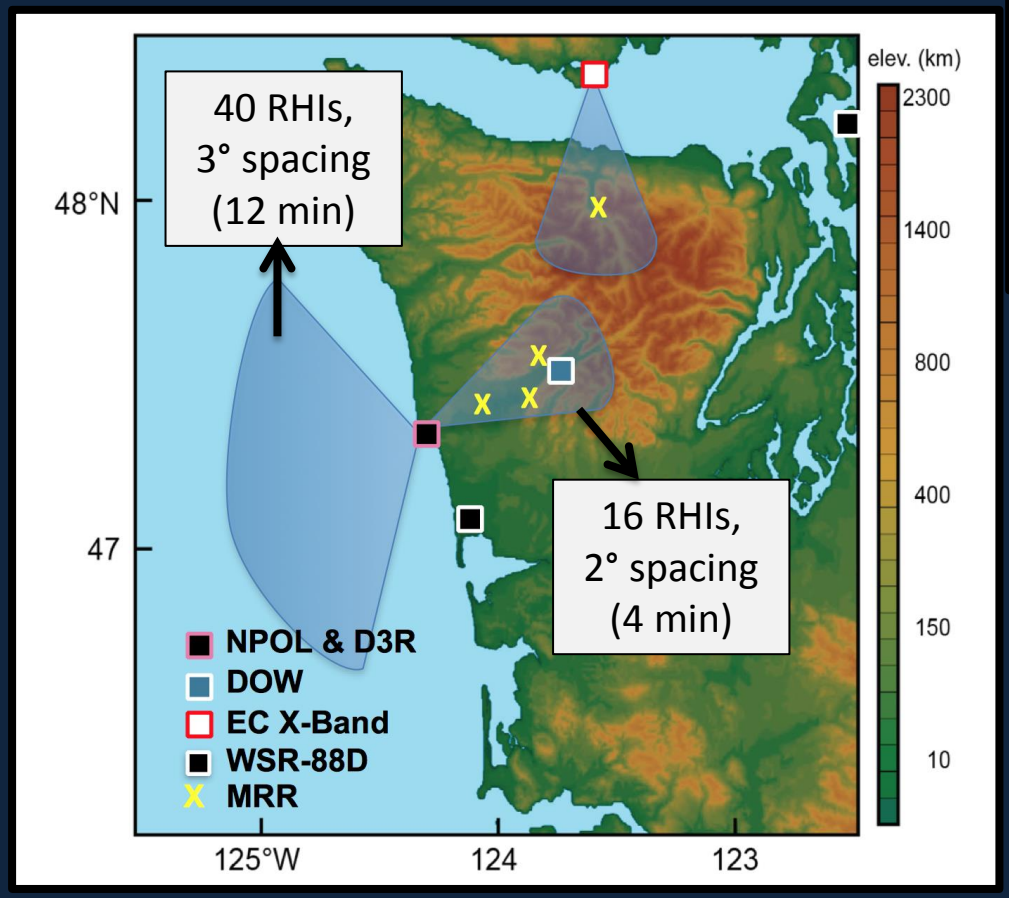
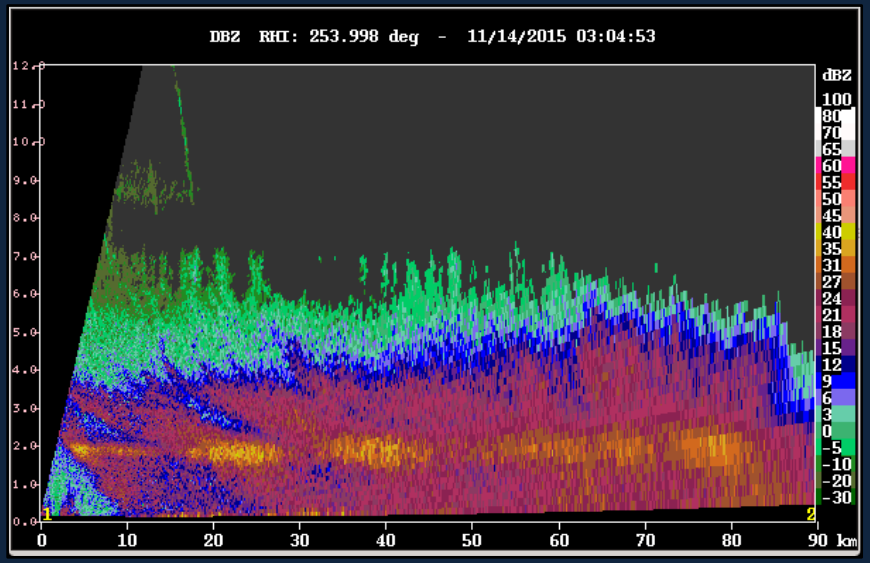
KLGX

- Full-volume scans every 5(?) minutes
- Great for precipitation estimates
- Not ideal for microphysical studies (high vertical resolution)



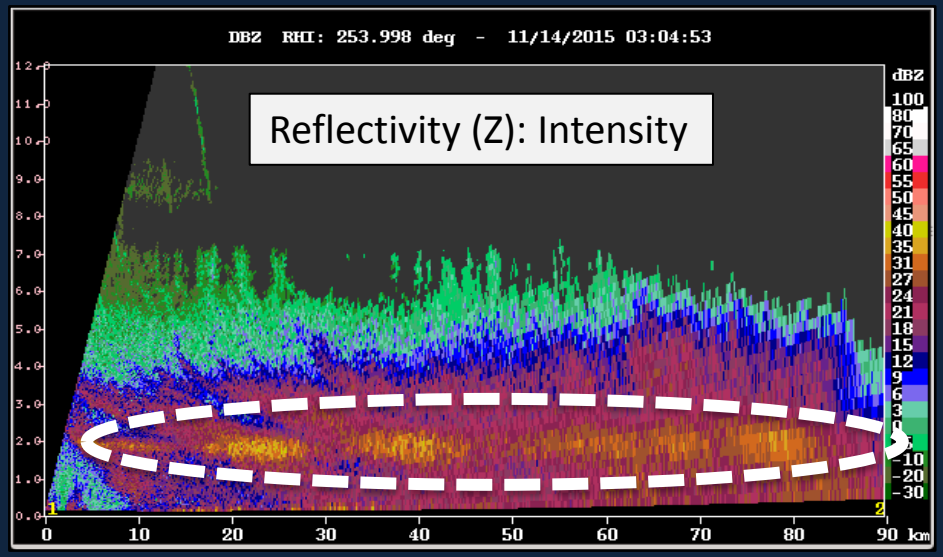
NPOL

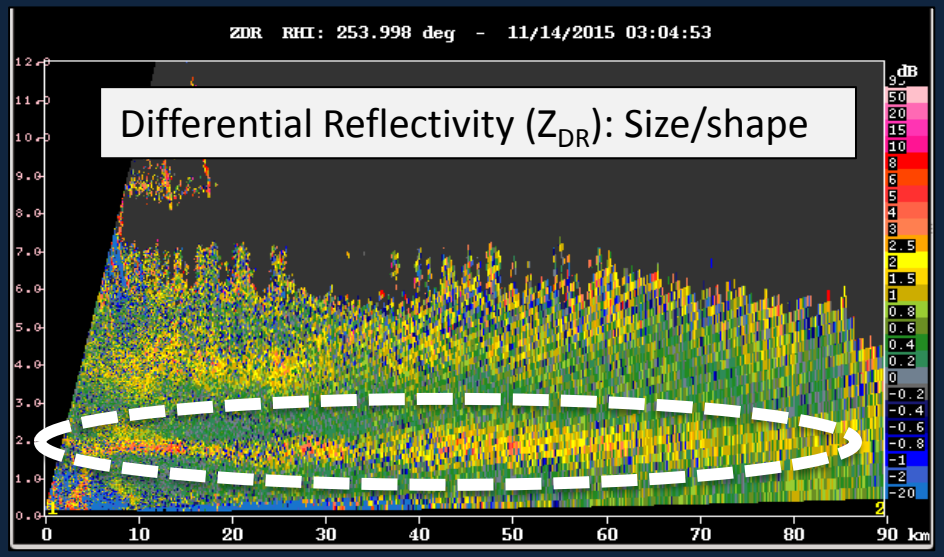

40 RHIs,
3° spacing
(12 min)
16 RHIs,
2° spacing
(4 min)
48°N
47
125°W
124
123
elev. (km)
2300
1400
800
400
150
10
NPOL & D3R
DOW
EC X-Band
WSR-88D
MRR

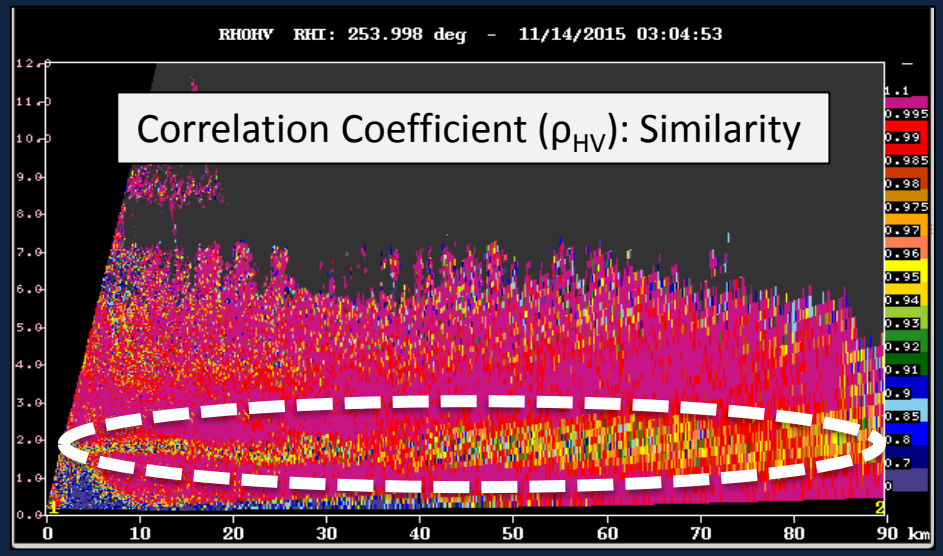

DBZ RHI: 253.998 deg - 11/14/2015 03:04:53
dBZ
100
80
70
65
60
55
50
45
40
35
31
27
24
21
18
15
12
9
6
3
0
-5
-10
-20
-30
0
10
20
30
40
50
60
70
80
90 km

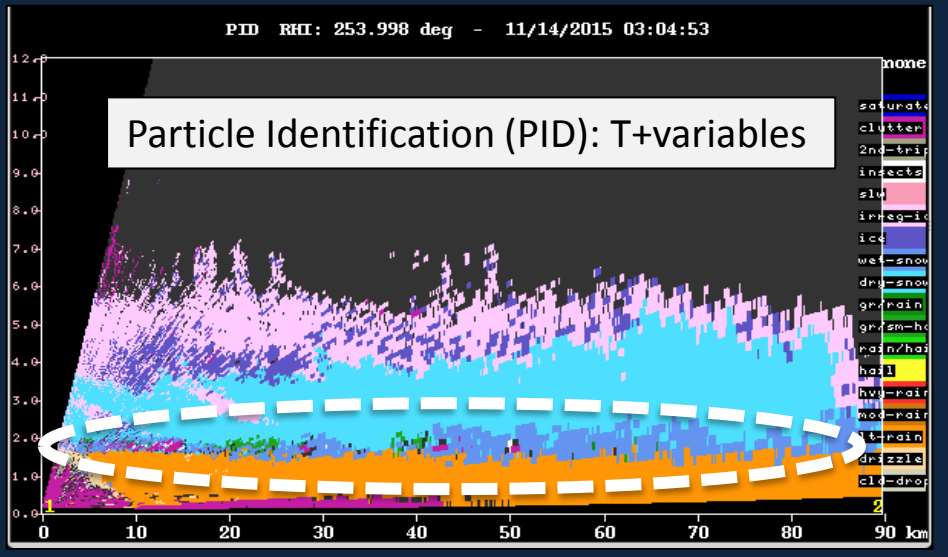
Brightband

14 Nov 2015



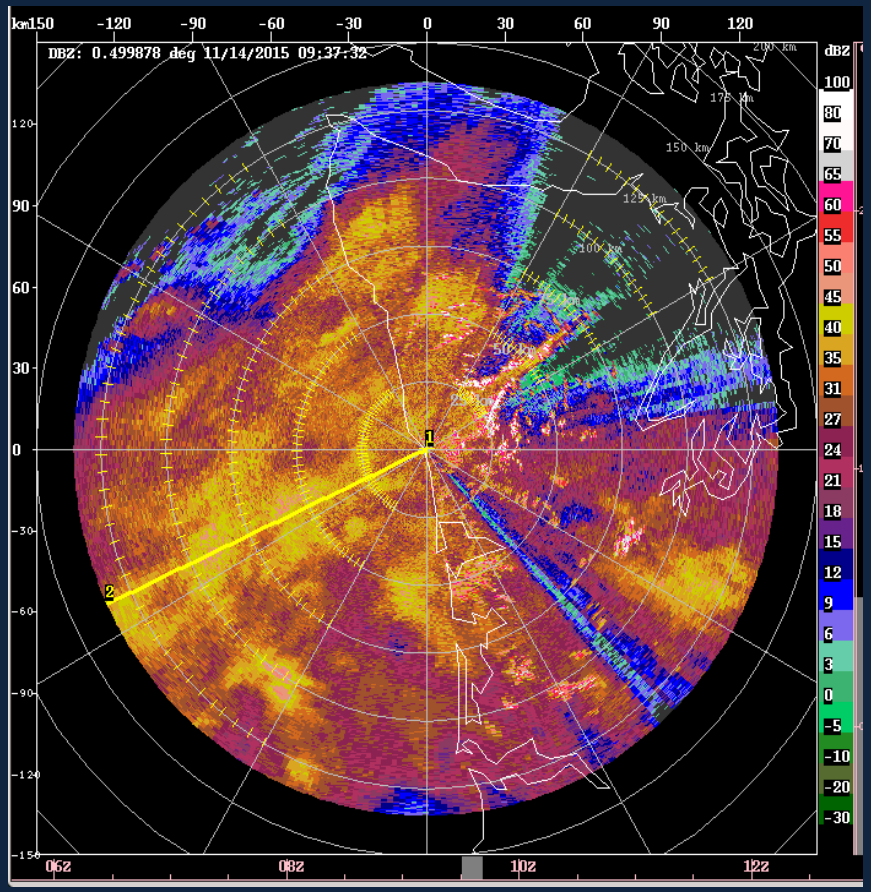


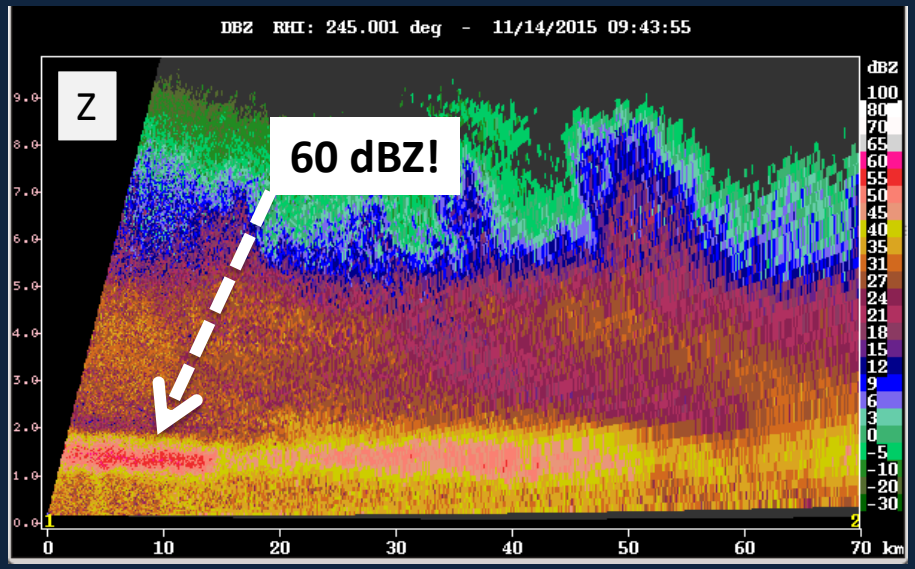


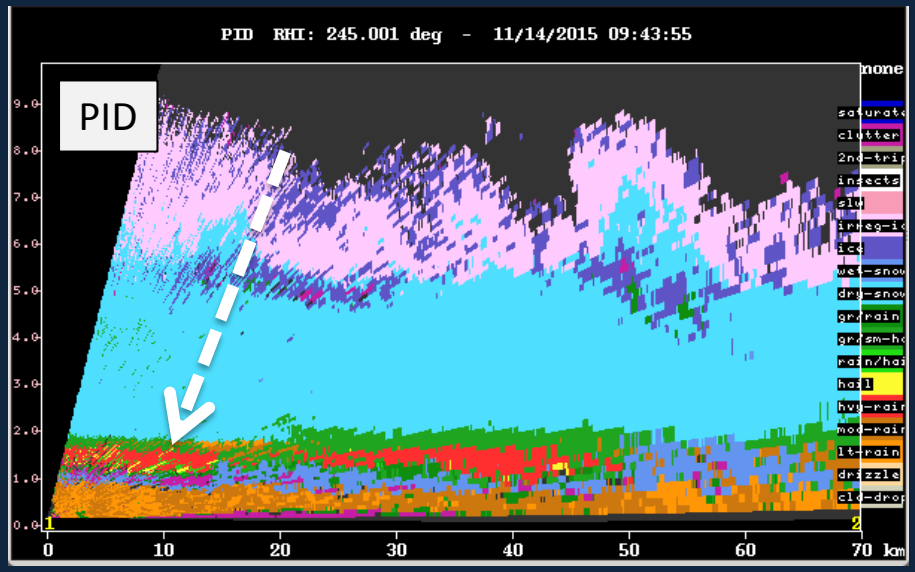


Brightband

14 Nov 2015

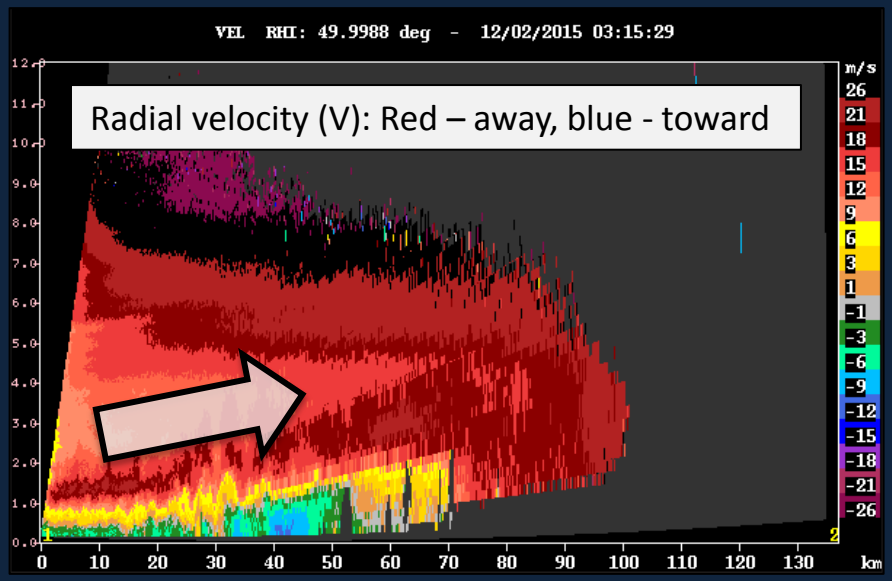


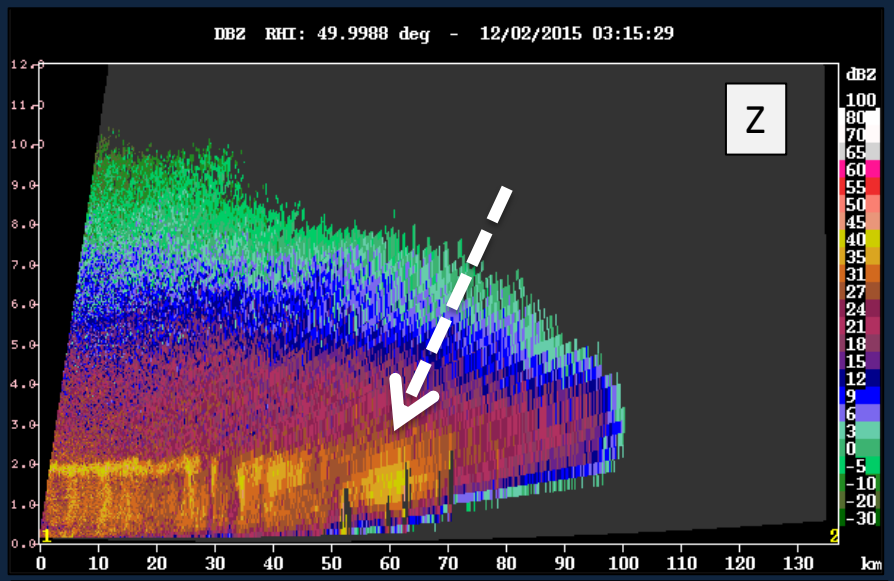


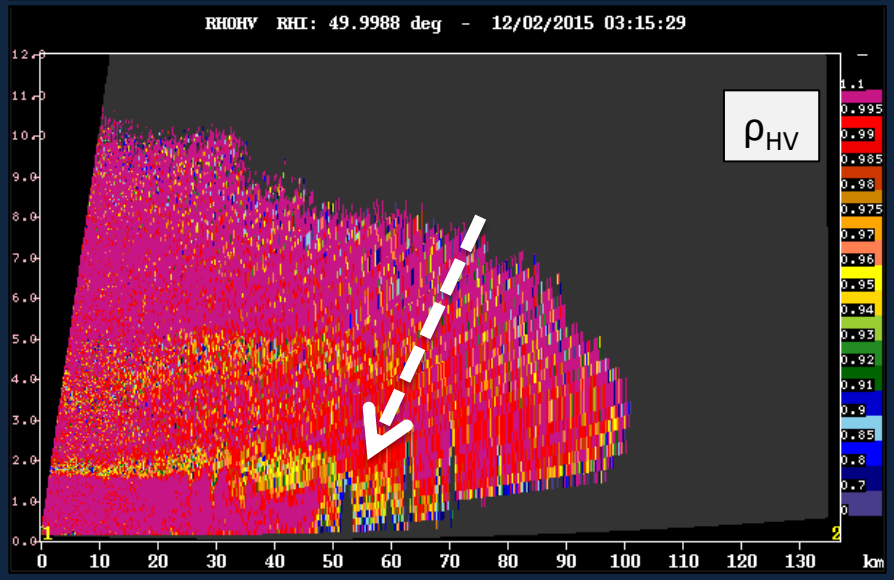


Role of terrain

2 Dec 2015







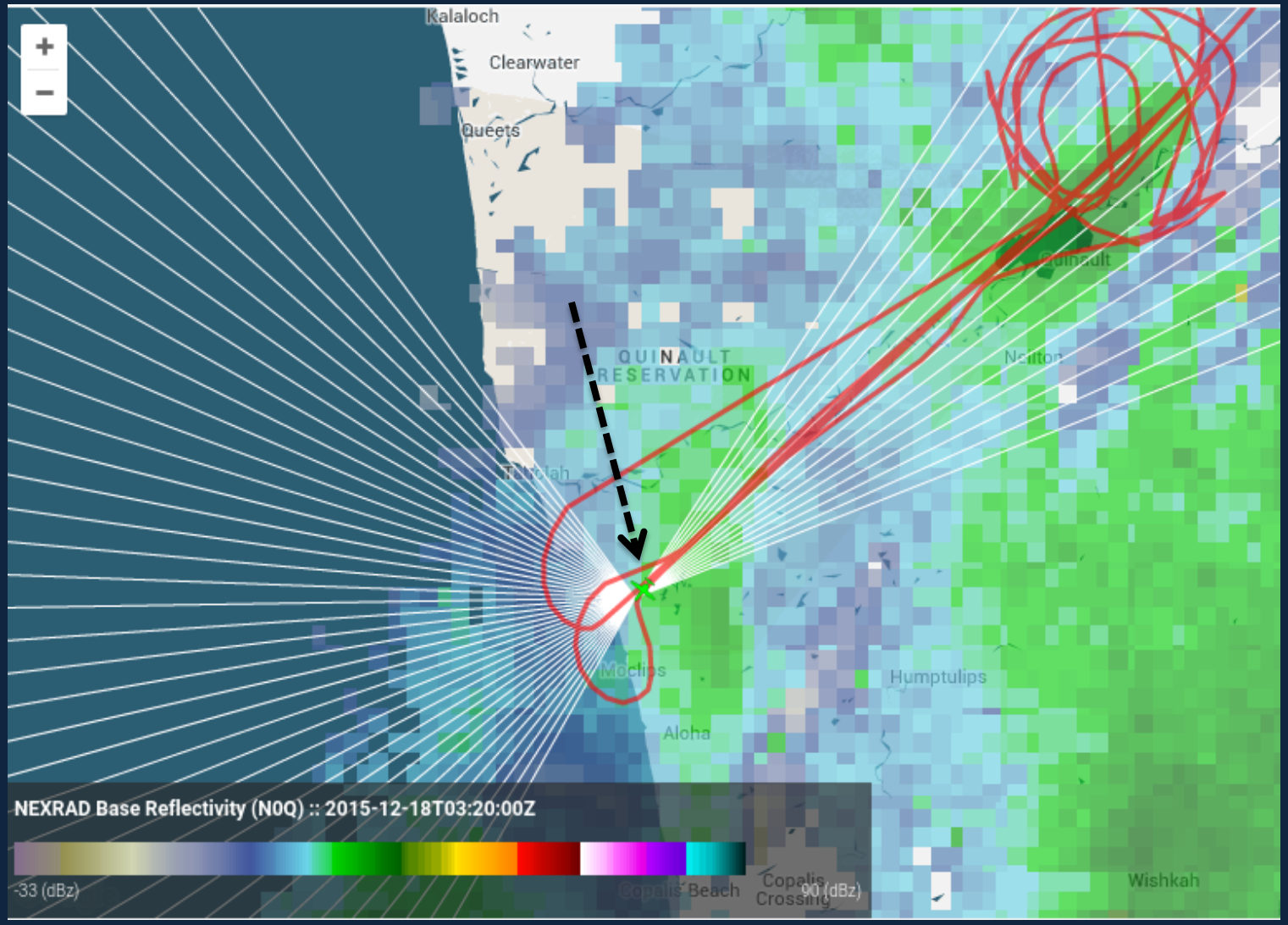
Lifting air (upstream of mountains)

Precipitation enhancement

Dipping of brightband

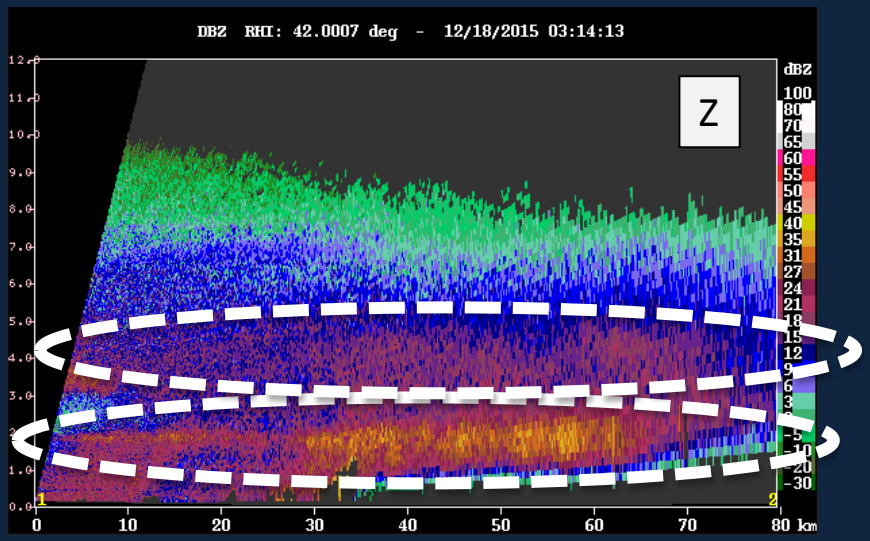
- Latent cooling (melting)
- Melting distance
- Adiabatic cooling (forced ascent)
- Preexisting cold air

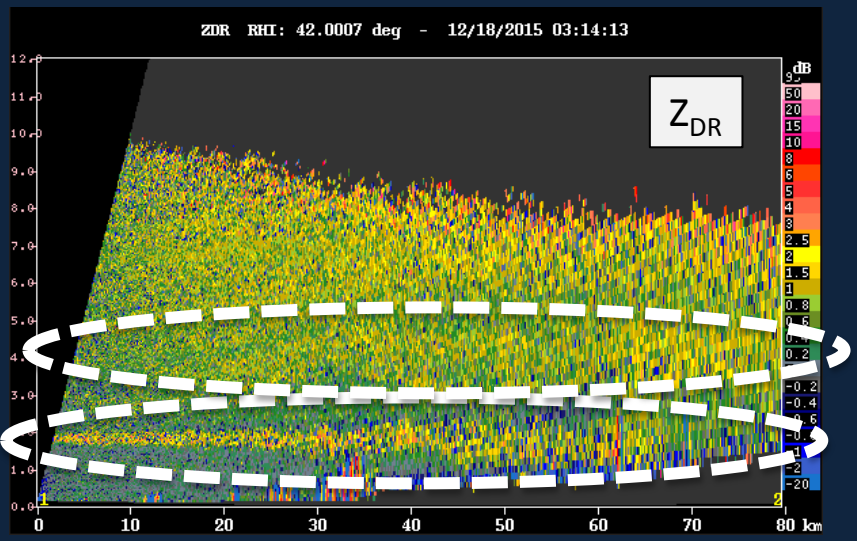
In-situ Aircraft Data

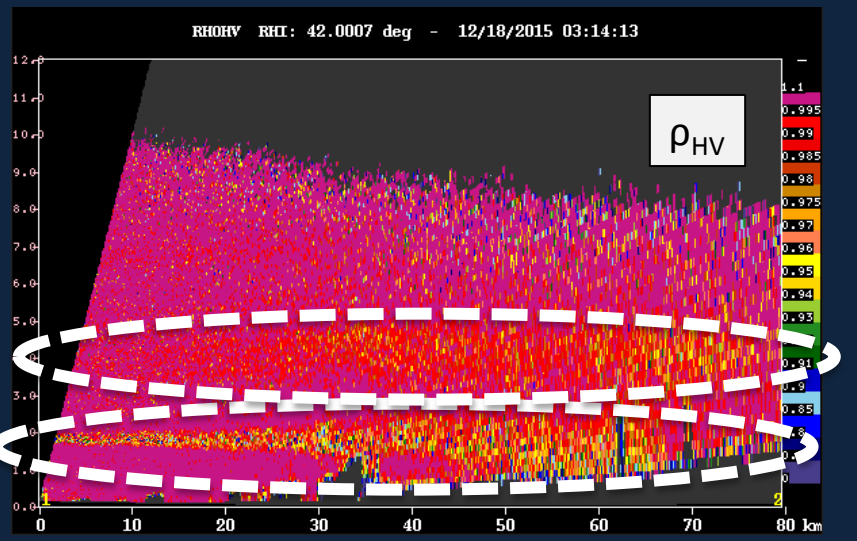


Microphysical processes

18 Dec 2015





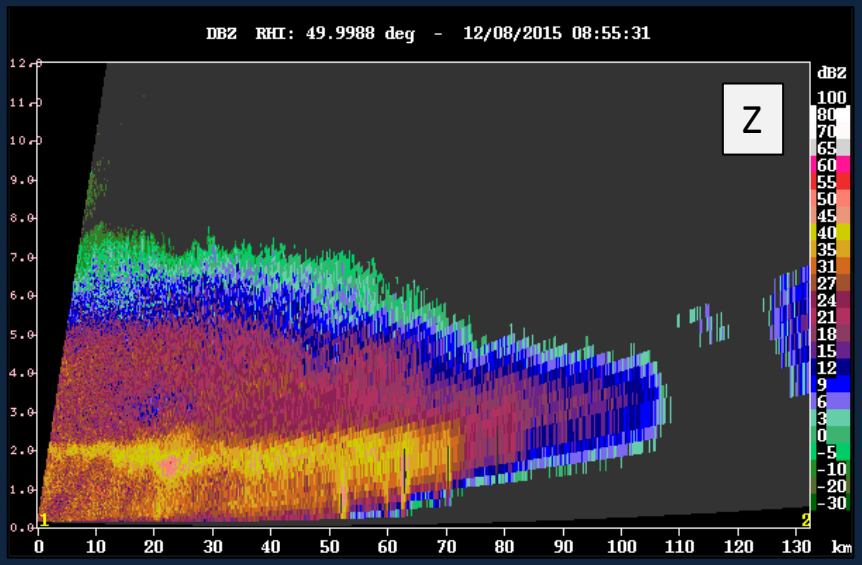


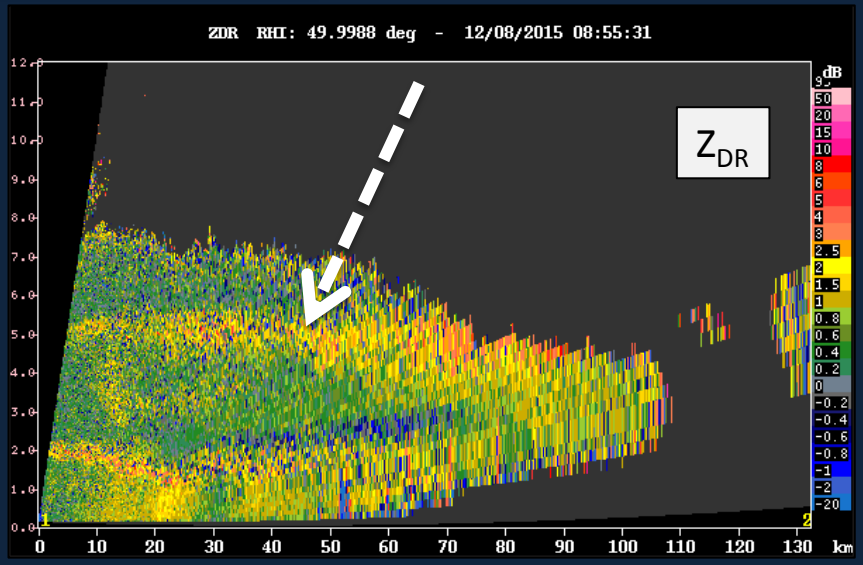
Citation: Flying at 14,000 FT (~ 4 km), noted ***plates***, ***capped*** columns, and ***plate*** aggregates

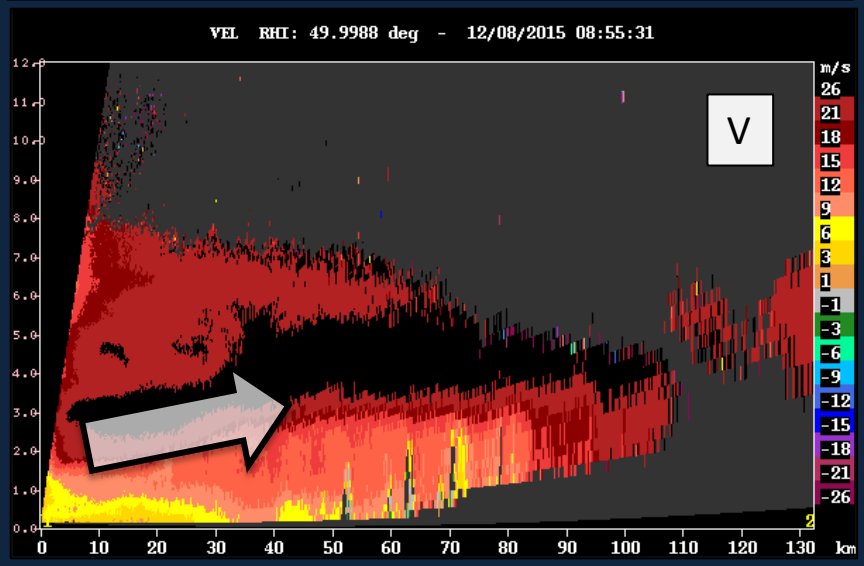
→Dendritic growth zone, aggregation

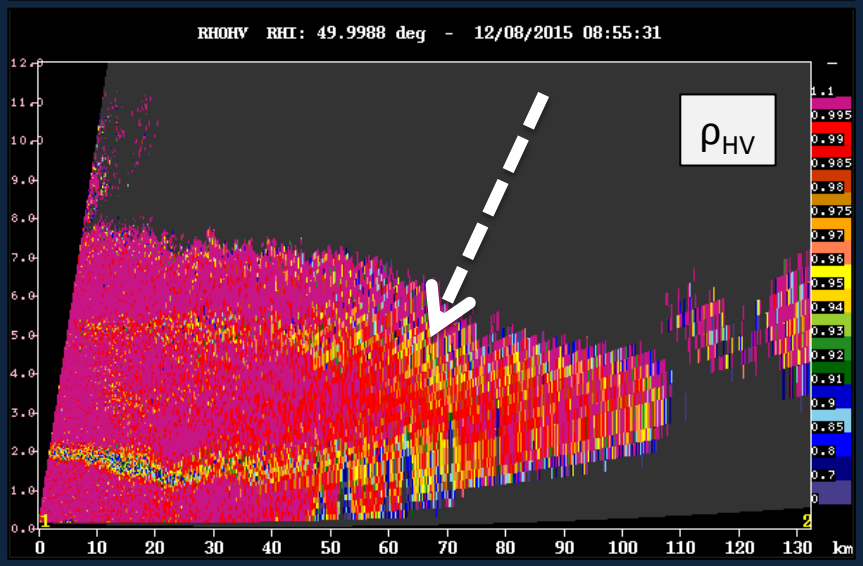
Dendritic growth zone

8 Dec 2015



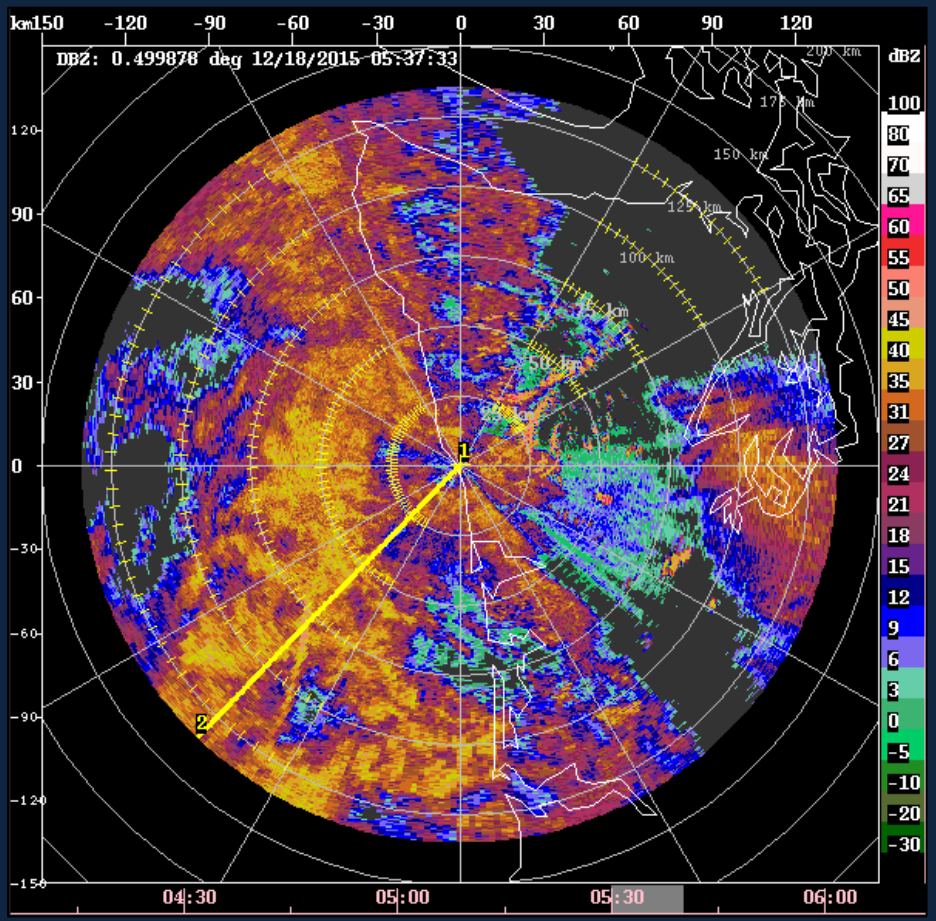


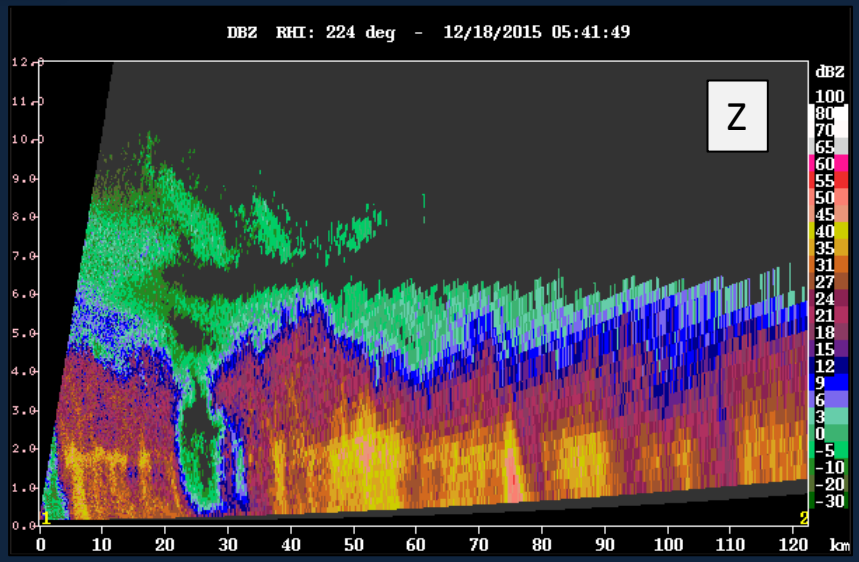


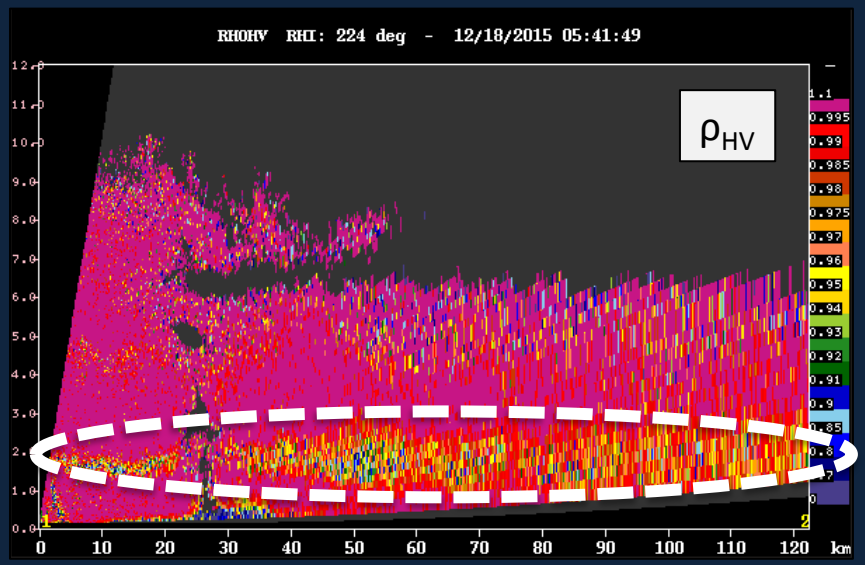


Frontal passage

18 Dec 2015

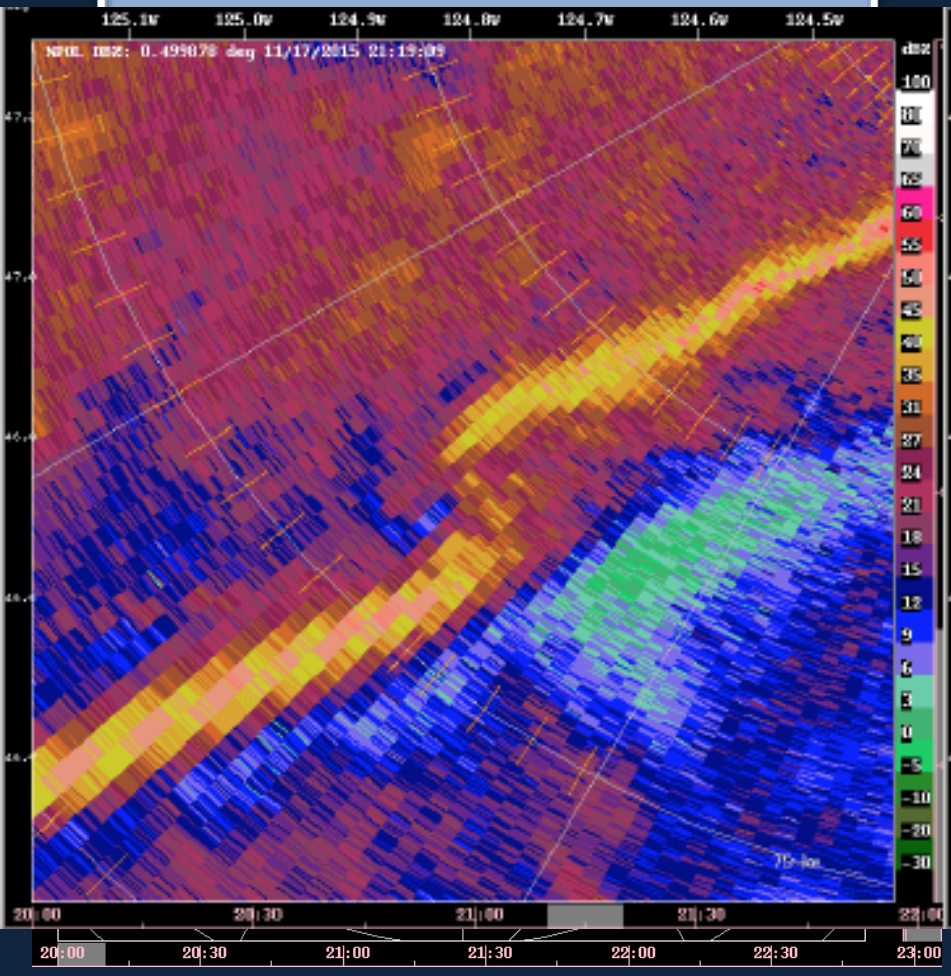


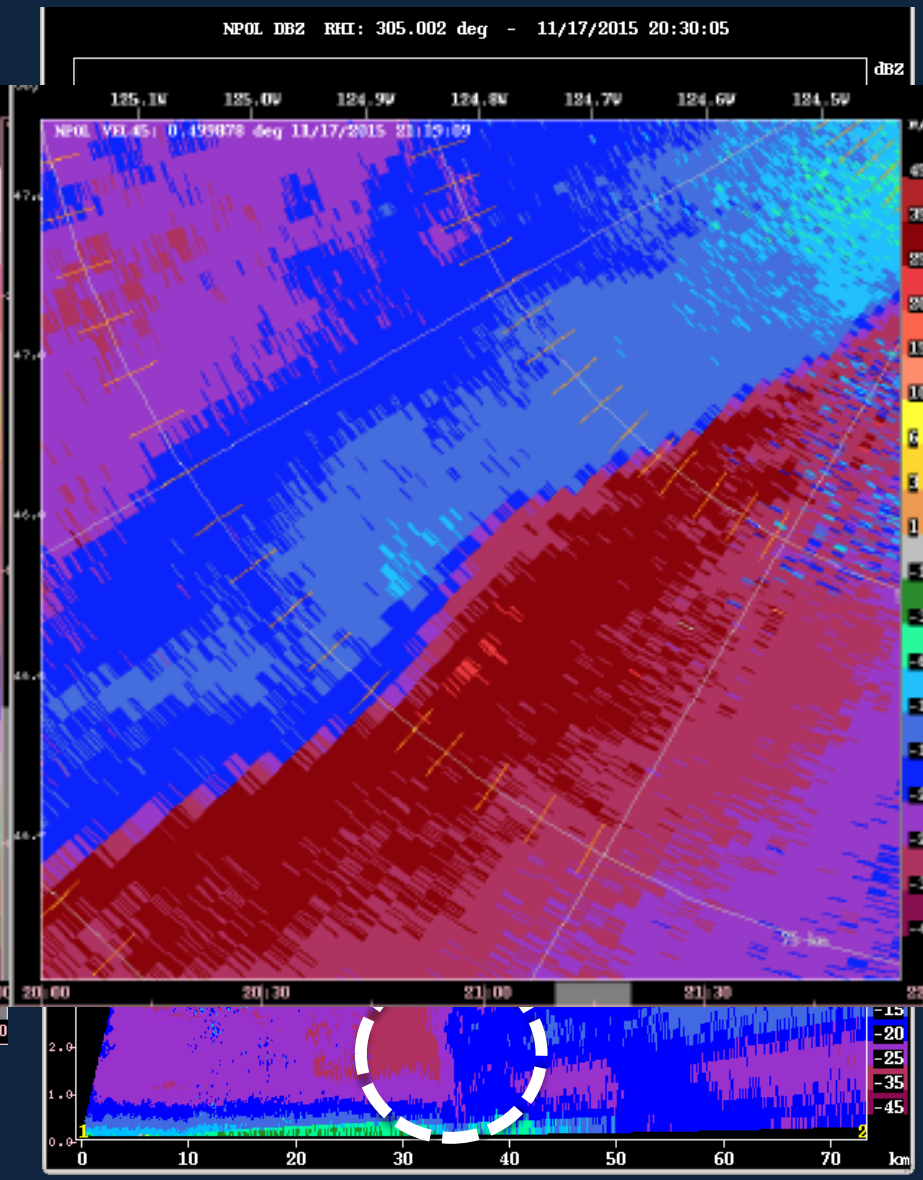




Narrow Cold Frontal Rainband

17 Nov 2015

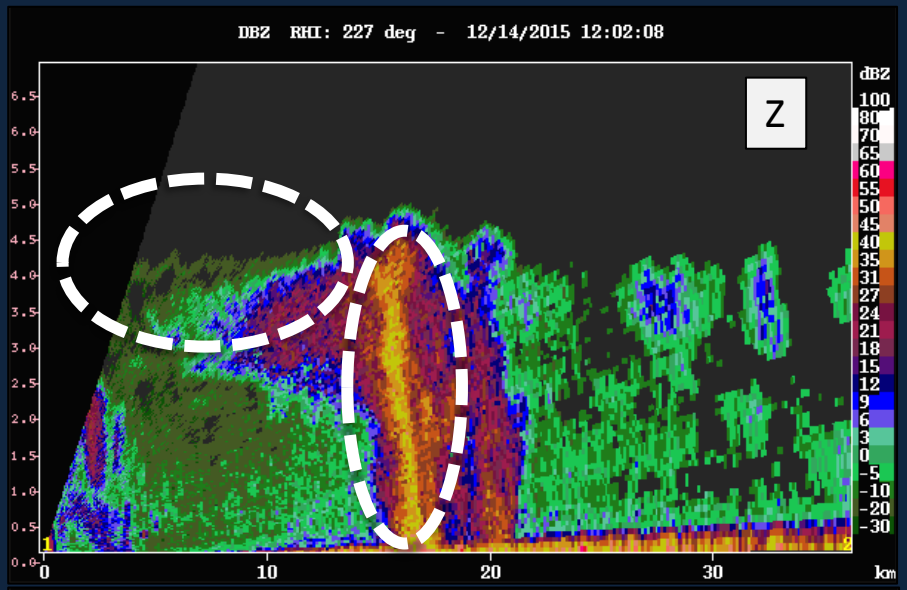


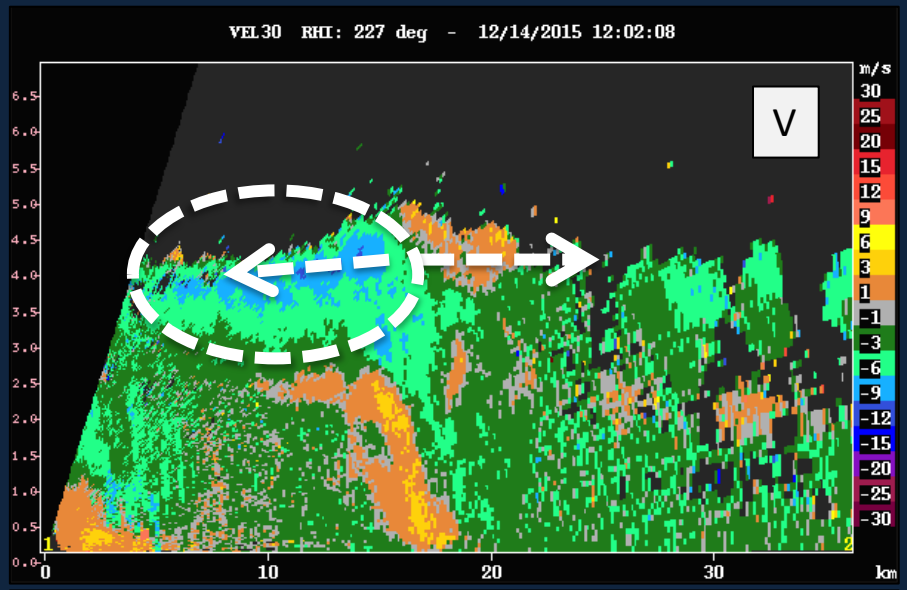


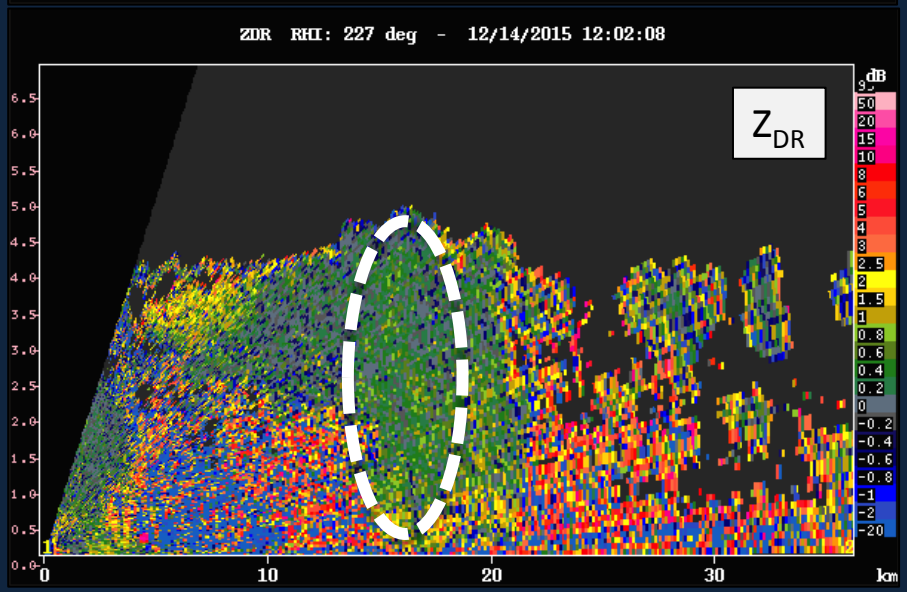
2000-2300 UTC

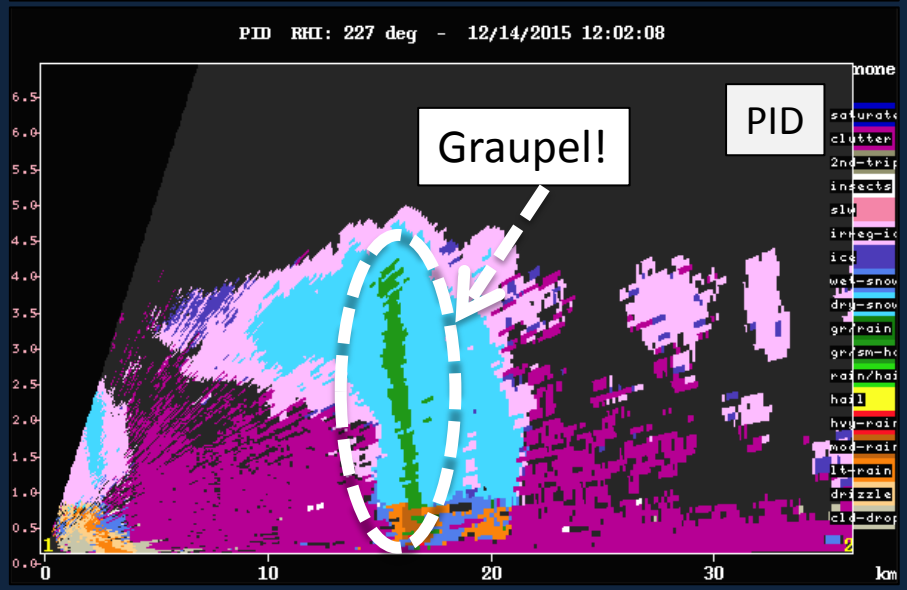
Post-frontal convection

14 Dec 2015

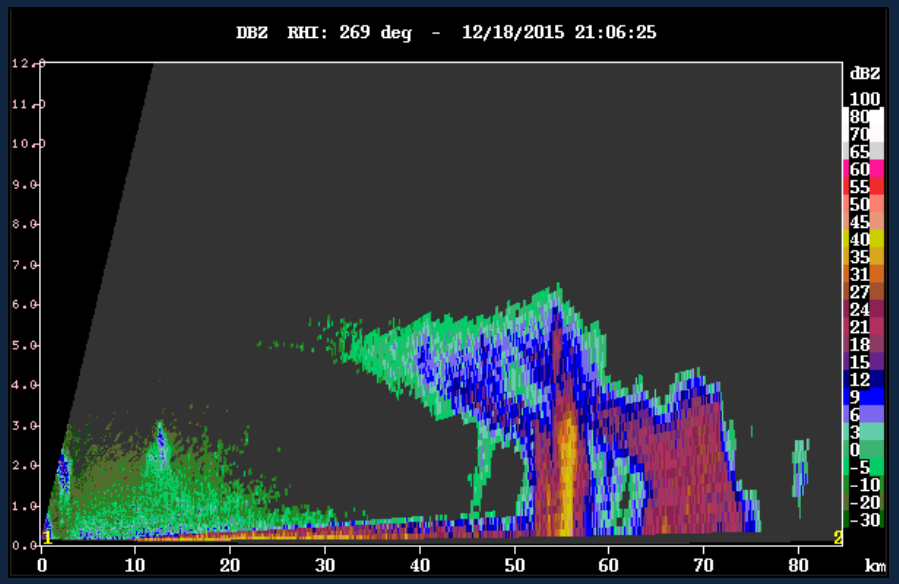








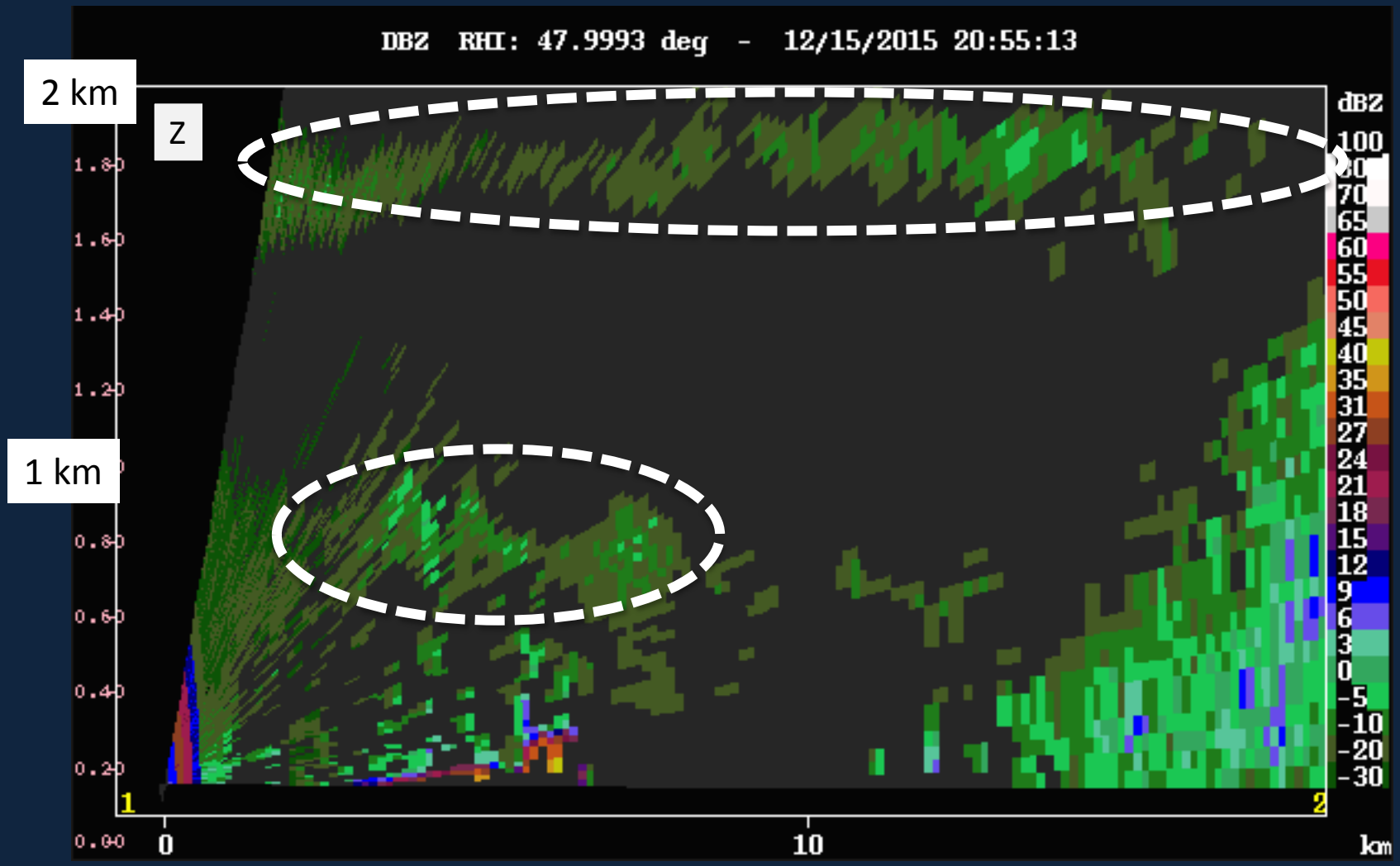
Post-frontal convection



18 Dec 2015

Mantle echoes

15 Dec 2015



NPOL Summary

- High vertical resolution for studying microphysical processes
  - Brightband
  - Dendritic growth/aggregation
- Role of topography
  - Ocean vs. valley
  - Lifting air
  - Precipitation enhancement (K-H waves)
- Warm-sector stratiform to post-frontal convection
- Sensitivity for studying full cloud lifecycle


Thank you!
This work is supported by
NASA Grant #NNX15AL38G

Kelvin-Helmholtz waves

17 Dec 2015

Kelvin-Helmholtz waves, observed for 5 hours (valley and ocean) by NPOL in stable layer with strong directional wind shear